

FEATURE 15: IMPORT MISSOURI RIVER WATER TO WILD RICE RIVER

Description

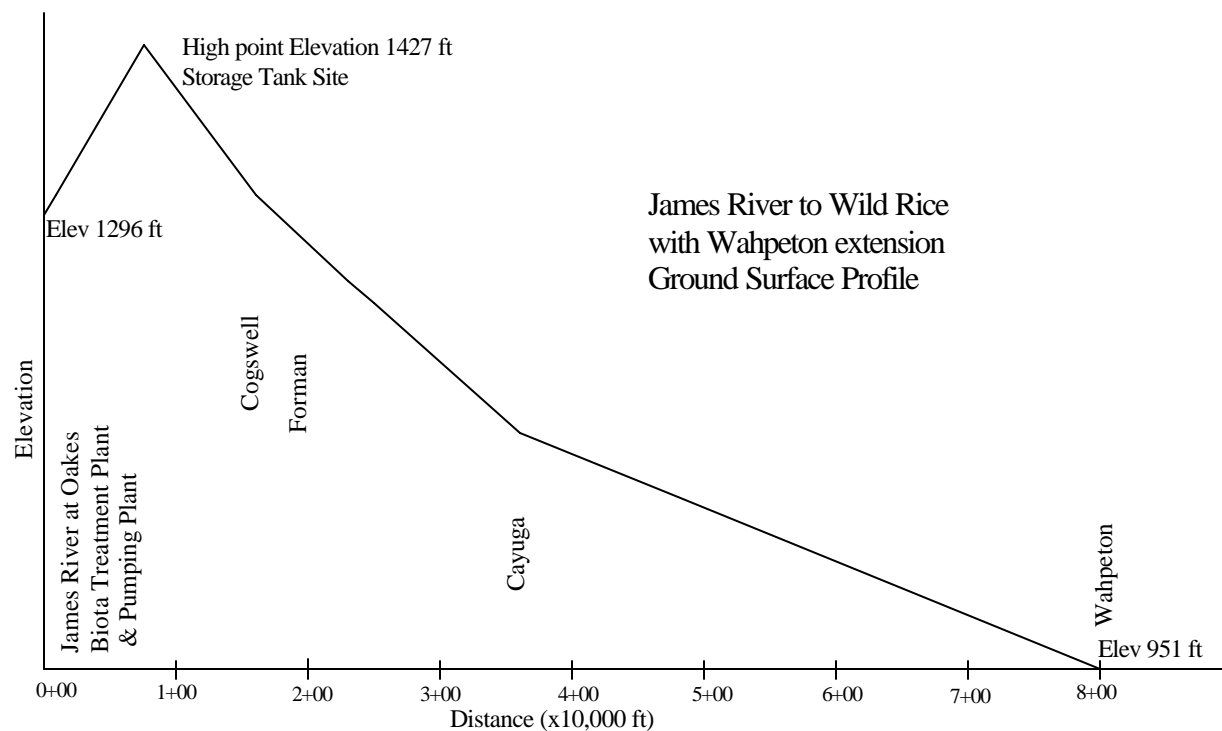
This information from NORTH DAKOTA WATER MANAGEMENT COLLABORATIVE PROCESS, Draft Data Sheets and Summary Matrix, Prepared for the Executive Steering Committee by the Technical Team, March 31, 1994, revised June 7, 1994, pg 75:

“A flow augmentation recommendation of 20 cfs is suggested for the Wild Rice River. While the annual mean flow for the Wild Rice River at Abercrombie is 71.1 cfs, it should be recognized that this gaging site represents a considerable drainage. The 20 cfs recommendation is based on a delivery system at or near the headwaters of the Wild Rice River. It is anticipated that channel capacities in the upper reaches of the Wild Rice would not be sufficient to support flows much greater than 20 cfs.”

This is considered to be a serious restriction as a conveyance system for future water supplies that utilize import water. The minimum amount of import currently identified is approximately 40 cfs when used in conjunction with a 22,000 ac-ft reservoir storage. The reservoir storage is necessary to provide peaking water supply that cannot be met by the steady 40 cfs import pipeline. Other import proposals developed without added storage are typically in the range of 70 to 100 cfs. The 20 cfs flow restriction also means that by the time water reaches the Wahpeton to Fargo area more losses have occurred due to seepage, evaporation, and plant community consumptive use. Therefore, only a portion of the original 20 cfs will reach the demand areas.

Additional consideration must be made for potential impacts to the Tewaukon National Wildlife Refuge and Lake Tewaukon, which are on the Wild Rice River. Experience with flow through proposals at Arrowwood National Wildlife Refuge on the James River indicate that significant impacts and mitigation may be possible.

For the purposes of cost estimate for this feature, two options have been considered. Missouri River water would be supplied to the upper James River from the New Rockford Canal via the New Rockford Canal overflow outlet. Diversion flow into the upper James River would be large enough to offset expected seepage and transport losses to the Oakes area. Previous model studies used a flow loss rate for the James River at an average of about 20 cfs. This water would then flow down the James and be collected in a ring dike near the town of Oakes. From the ring dike, water would be pumped to a storage tank site about 7.5 miles away. Water could then flow by gravity from the tank to either (option 1) the Wild Rice River near Cayuga, or (option 2) via pipeline directly to Wahpeton. The flow to the Wild Rice River is limited to about 20 cfs. If the pipe were extended directly to Wahpeton, a range of 68 to 108 cfs can be used to meet all Red River future shortages. The added distance beyond Cayuga is about 49 miles. For the Wahpeton pipe delivery option, a pressure reducing valve and vault, or a stilling basin at the Red River, would be required to dissipate excess head.



Some costs have been extrapolated from other feature estimates and are summarized in the following table.

Table 15.1
Costs Associated With The Use of Existing GDU Facilities

	Construction Cost	Annual OM&R	Annualized Cost
36 mi. Pipeline @ 20 cfs	\$43,000,000	\$490,000	\$3,560,000
85 mi. Pipeline @ 68 cfs	\$210,000,000	\$1,250,000	\$16,230,000
85 mi. Pipeline @ 108 cfs	\$270,000,000	\$1,640,000	\$20,900,000

Feature 15

Pipeline Hydraulics

Line Reach	EL or HGL	Pump Boost ft	Head 1 (begin) EL ft	Pipe diam. Inches	Flow Q cfs	Vel. V fps	Length in 1000'	Sta end	Head Lost ft	1.05 x head lost	Head 2 (end)	Delivery or ground EL	HGL above ft	Approx. Ave. Pipe Press. Class, reach
James River to Wild Rice River														
1	1295	200	1495	33	20	3.37	39.6	396	41.5	43.5	1451.5	1427	24.5	150
2	1451		1451	30	20	4.07	120	1596	207.3	217.6	1233.8	1180	53.8	200
3	1234		1234	27	20	5.03	30.5	1901	91.6	96.2	1137.7	1132	5.7	300
James River to Wahpeton														
1	1295	200	1495	54	68	4.28	39.6	396	36.1	37.9	1457.1	1427	30.1	150
2	1457		1457	54	68	4.28	120	1596	109.5	114.9	1342.1	1180	162.1	200
3	1342		1342	54	68	4.28	30.5	1901	27.8	29.2	1312.9	1132	180.9	300
4	1313		1313	54	68	4.28	130	3201	118.6	124.5	1188.4	1040	148.4	400
5	1188		1188	48	68	5.41	128.7	4488	217.9	228.8	959.6	951	8.6	500
James River to Wahpeton														
1	1295	200	1495	66	108	4.55	39.6	396	31.8	33.4	1461.6	1427	34.6	150
2	1462		1462	66	108	4.55	120	1596	96.3	101.1	1360.5	1180	180.5	200
3	1361		1361	60	108	5.50	30.5	1901	40.4	42.4	1318.2	1132	186.2	300
4	1318		1318	60	108	5.50	130	3201	172.0	180.6	1137.5	1040	97.5	400
5	1138		1138	60	108	5.50	128.7	4488	170.3	178.8	958.7	951	7.7	500

The reservoir intake pumping plants require air chambers at the discharge outlet

The systems would use a regulating tank at Sta 396+00

For 20 cfs, the operating water surface would be 1451.5

For 68 cfs, the operating water surface would be 1457.1

For 108 cfs, the operating water surface would be 1461.6

Tank volume data estimates, gallons

Data	System Q		
	20	68	108
Vol	200,000	700,000	1,000,000
Height	24'	30'	35'

Pumping plant data estimates

System	Units	Pump Q	Pump H	Motor HP
20	4	5	200	200
68	6	11.3	200	400
108	8	13.5	200	450

Add one spare unit at each plant

ESTIMATE WORKSHEET

FEATURE:

10-Jun-99 PROJECT:

Feature 15C
108 cfs Pipeline from James River
To Wahpeton
85 miles long

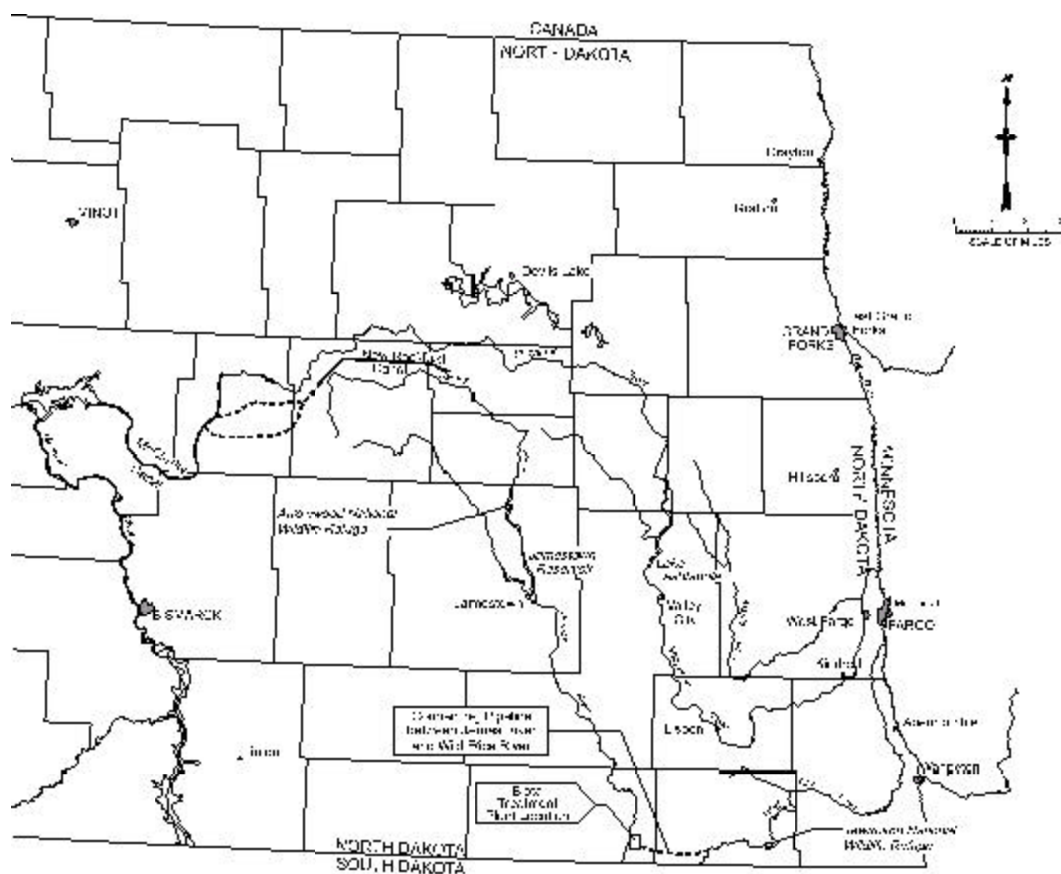
Red River Valley Water Supply

DIVISION:

FILE:

J:\REDRIVER\RRRORRURAL.WK4

PLANT ACCT.	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	LIFE	Annual Operation	Annual Maintenance	Annual Replacement	Annual Energy	TOTAL ANNUAL
		Furnish and install pipe with earthwork & ROW costs											
		66B150		7.50	miles	\$1,229,000	\$9,217,500	50+			\$6,600		\$6,600
		66B200		22.70	miles	\$1,229,000	\$27,898,300	50+			\$19,900		\$19,900
		60B300		5.80	miles	\$1,099,000	\$6,374,200	50+			\$4,500		\$4,500
		60B400		24.60	miles	\$1,336,000	\$32,865,600	50+			\$23,400		\$23,400
		60B500		24.40	miles	\$1,548,000	\$37,771,200	50+			\$26,900		\$26,900
		Blowoff Installations (2 per mile)		170	EA	\$8,000	\$1,360,000	50+					
		Air Valve Installations (2 per mile)		170	EA	\$5,000	\$850,000	50+					
		Surge Protection Chamber			LS		\$700,000	50+					
		Pumping Plant at James River (200'-108cfs)			LS		\$6,300,000	35+	\$130,000	\$45,000		\$790,000	\$965,000
		Regulating Tank (1,000,000 gallons, 35' high)			LS		\$500,000	50+					
		Overhead electrical supply to each pump station (assumes 20 miles for each pump station)		20	miles	\$40,000	\$800,000	45			\$57,900		\$57,900
		Cathodic Protection for pipeline		85.00	miles	\$26,400	\$2,244,000	20			\$209,800		\$209,800
		Pipe Jacking (one per 4 miles, 72" carrier pipe X 100')		21	EA	\$77,500	\$1,627,500	50+					
		Telemetry System			LS		\$700,000	10			\$49,600		\$49,600
								Subtotal	\$130,000	\$45,000	\$398,600	\$790,000	\$1,363,600
		Mobilization (+/- 5%)					\$6,500,000					Unlisted Items (+/- 20%)	\$276,400
		SUBTOTAL					\$135,708,300						
		Unlisted Items (+/- 20%)					\$24,291,700					TOTAL O, M, R, & E	\$1,640,000
		CONTRACT COST					\$160,000,000						
		Contingencies (+/- 25%)					\$40,000,000						
		FIELD COST					\$200,000,000						
		USBR Invest., Mitig., Engr. & Constr. Mgt. (+/- 33%)					\$70,000,000						
		TOTAL ESTIMATE					\$270,000,000					ANNUALIZED CAPITAL COST	\$19,250,000
QUANTITIES			PRICES										
BY	J. Baysinger		BY	K. Copeland		CHECKED	2P 6/10/99						
DATE PREPARED	3/19/99		DATE	6/10/99		PRICE LEVEL	Appraisal						
	APPROVED											TOTAL ANNUAL COST	\$20,890,000



Feature 15 Import Missouri River Water to Wild Rice River